DOCUMENT RESUME

ED 225 836 SE 040 195

AUTHOR Herbert, Martin
TITLE Achievement of Former CSMP Students at Fourth Grade. Evaluation Report 7-B-5. Extended Pilot Trial of the Comprehensive School Mathematics Program.
INSTITUTION CEMREL, Inc., St. Louis, Mo.
SPONS AGENCY National Inst. of Education (ED), Washington, DC.
PUB DATE Dec 80
NOTE 29p.; For related documents, see SE 040 181-196 and SE 040 340-348.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Educational Research; *Elementary School Mathematics; *Grade 4; Intermediate Grades; *Mathematics Achievement; Mathematics Curriculum; Mathematics Instruction; *Program Evaluation; Testing
IDENTIFIERS *Comprehensive School Mathematics Program; Mathematics Applied to Novel Situations Test; *Mathematics Education Research

ABSTRACT

The Comprehensive School Mathematics Program (CSMP) is a program of CEMREL, Inc., one of the national educational laboratories, and was funded by the National Institute of Education (NIE). Its major purpose is the development of curriculum materials for grades kindergarten through 6. A comparison of student achievement at the end of fourth grade on the Mathematics Applied to Novel Situations (MANS) Scales was conducted in a district where CSMP was taught only in kindergarten through grade 3, after which the district's regular program was used. These classes were compared to classes with no CSMP experience. The CSMP-background classes had significantly higher scores on nine scales: 1) two of six computation measures; 2) three of five estimation scales; 3) two of five evaluating number relationship; 4) one of three other number system measures; and 5) one of two place value scales. On no scale was there a significant difference in favor of the non-CSMP classes. It was viewed as surprising that the data were strikingly similar to those obtained in a previous large study in which the CSMP group had been with this curriculum through the fourth grade. (MP)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

EXTENDED PILOT TRIALS OF THE COMPREHENSIVE SCHOOL MATHEMATICS PROGRAM:

EVALUATION REPORT SERIES

Evaluation Report 7-B-5
Achievement of Former CSMP Students at Fourth Grade

ED225836

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

✓ This document has been reproduced as received from the person or organization originating it.

Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

CEMREL INC.

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

SE040195

Extended Pilot Trial of the
Comprehensive School Mathematics Program

Evaluation Report 7-B-5
Achievement of Former CSMP Students At Fourth Grade

Martin Herbert

December, 1980

Developed by CEMREL, Inc., a private nonprofit corporation supported in part as an educational laboratory by funds from the National Institute of Education, Department of Health, Education, and Welfare. The opinions expressed in this publication do not necessarily reflect the position or policy of the National Institute of Education, and no official endorsement should be inferred.

Copyright on these materials is claimed only during the period of development, test, and evaluation, unless additional authorization is granted by the National Institute of Education, to claim copyright on the final materials. For information on the status of the copyright claim, contact either the copyright proprietor or the National Institute of Education.

Description of Evaluation Report Series

The Comprehensive School Mathematics Program (CSMP) is a program of CEMREL, Inc., one of the national educational laboratories, and is funded by the National Institute of Education. Its major purpose is the development of curriculum materials for grades K-6.

Beginning in September, 1973, CSMP began an extended pilot trial of its Elementary Program. The pilot trial is longitudinal in nature; students who began using CSMP materials in kindergarten or first grade in 1973-74, were able to use them in first and second grades respectively in 1974-75, and so on in subsequent years. Hence the adjective "extended".

The evaluation of the program in this extended pilot trial is intended to be reasonably comprehensive and to supply information desired by a wide variety of audiences. For that reason the reports in this series are reasonably non-technical and do not attempt to widely explore some of the related issues. The list of reports through year six is given on the next page. The following reports are planned for year 7:

7-B-1 - Fifth Grade Evaluation: Volume I, Summary
7-B-2 - Fifth Grade Evaluation: Volume II, Test Data
7-B-3 - Fifth Grade Evaluation: Volume III, Non-Test Data
7-B-4 - Re-evaluation of Second Grade, Revised MANS Tests
7-B-5 - Achievement of Former CSMP Students at Fourth Grade
7-B-6 - Student Achievement, Rapid Implementation Model

Extended Pilot Trials of the
Comprehensive School Mathematics Program

Evaluation Report Series

Evaluation Report 1-A-1	Overview, Design and Instrumentation
Evaluation Report 1-A-2	External Review of CSMP Materials
Evaluation Report 1-A-3	Final Summary Report Year 1
Evaluation Report 1-B-1	Mid-Year Test Data: CSMP First Grade Content
Evaluation Report 1-B-2	End-of-Year Test Data: CSMP First Grade Content
Evaluation Report 1-B-3	End-of-Year Test Data: Standard First Grade Content
Evaluation Report 1-B-4	End-of-Year Test Data: CSMP Kindergarten Content
Evaluation Report 1-B-5	Test Data on Some General Cognitive Skills
Evaluation Report 1-B-6	Summary Test Data: Detroit Schools
Evaluation Report 1-C-1	Teacher Training Report
Evaluation Report 1-C-2	Observations of CSMP First Grade Classes
Evaluation Report 1-C-3	Mid-Year Data from Teacher Questionnaires
Evaluation Report 1-C-4	End-of-Year Data from Teacher Questionnaires
Evaluation Report 1-C-5	Interviews with CSMP Kindergarten Teachers
Evaluation Report 1-C-6	Analysis of Teacher Logs
Evaluation Report 2-A-1	Final Summary Report Year 2
Evaluation Report 2-B-1	Second Grade Test Data
Evaluation Report 2-B-2	Readministration of First Grade Test Items
Evaluation Report 2-B-3	Student Interviews
Evaluation Report 2-C-1	Teacher Questionnaire Data
Evaluation Report 2-C-2	Teacher Interviews, Second Grade
Evaluation Report 2-C-3	Teacher Interviews, First Grade
Evaluation Report 3-B-1	Second and Third Grade Test Data Year 3
Evaluation Report 3-C-1	Teacher Questionnaire Data Year 3
Evaluation Report 4-A-1	Final Summary Report Year 4
Evaluation Report 4-B-1	Standardized Test Data, Third Grade
Evaluation Report 4-B-2	Mathematics Applied to Novel Situations (MANS) Test Data
Evaluation Report 4-B-3	Individually Administered Problems, Third Grade
Evaluation Report 4-C-1	Teacher Questionnaire Data, Third Grade
Evaluation Report 5-B-1	Fourth Grade MANS Test Data
Evaluation Report 5-B-2	Individually Administered Problems, Fourth Grade
Evaluation Report 5-C-1	Teacher Questionnaire and Interview Data, Fourth Grade
Evaluation Report 6-B-1	Comparative Test Data: Fourth Grade
Evaluation Report 6-B-2	Preliminary Test Data: Fifth Grade
Evaluation Report 6-C-1	Teacher Questionnaire Data: Grades 3-5

Key to Indexing

Evaluation Reports are labelled m-X-n,

where m is the year of the pilot study, with 1973-74 as Year 1.
X is the type of data being reported where A is for overviews and summaries, B is for student outcomes and C is for other data.
n is the number within a given year and type of data.

Table of Contents

Summary 1

Introduction 3

The MANS Tests and Previous Studies 5

Comparison of Class Means 7

District Level Comparisons 17

Appendix: Class Means by MANS Category 25

Summary

A comparison of student achievement at the end of fourth grade on the MANS Scales was conducted in a district where CSMP was taught only in grades K-3, after which the district's regular program was used. These "CSMP" classes were compared with non-CSMP students who had no previous CSMP experience. Except for this difference, the study was identical to one conducted a year earlier in which the CSMP classes had, in fact, studied CSMP from K-4.

Results: CSMP Versus Non-CSMP

The CSMP classes had significantly higher scores, at the .05 level, on nine scales:

2 of the 6 Computation scales
3 of the 5 Estimation scales
2 of the 5 Number Relationship scales
1 of the 3 Other Number System scales
1 of the 2 Place Value scales

On no scale was there a significant difference in favor of the non-CSMP classes. Overall, the mean score across the 24 scales was 136.7 for the CSMP classes versus 118.4 for the non-CSMP classes, a 15% difference which must be considered significant, educationally as well as statistically.

These Results Versus Previous Results At Other Sites

Surprisingly, (since these CSMP classes had been away from CSMP for a year), the data were strikingly similar to the data obtained in a previous large study in which the CSMP classes had studied CSMP through fourth grade. The exceptions were: a) the 5 scales dealing with number relationships and a scale on decimals, in each of which the CSMP advantage was about half what it was previously, and b) the standardized computation test, where CSMP classes did about 10% better than non-CSMP classes, a finding exactly the reverse of what happened previously.

Introduction

The Comprehensive School Mathematics Program (CSMP) is a K-6 mathematics curriculum, but its greatest usage now occurs in grades K-3, with relatively fewer schools using the program in the intermediate grades (4-6). The present study is an attempt to answer a question which follows from this fact: do students who study CSMP only through third grade retain, a year later, some of the already demonstrated benefits of the program?[1]

The present study took place in a small New England city in which CSMP has been used in grades K-3 in some of the schools, but not in subsequent grades. In the spring of 1980 a series of tests was administered to fourth graders in four schools. Two of these schools (7 classes in all) used CSMP in K-3 and the regular district program in fourth grade. The other two schools (7 classes) used the regular district program in all of grades K-4. The tests used were the same ones used previously in an evaluation study comparing CSMP fourth graders, who had studied CSMP in grades K-4, with non-CSMP fourth graders. A comparison of these two studies will be presented, providing evidence about the degree to which students, after a year away from CSMP, are still able to do various kinds of mathematical tasks better than students with no CSMP experience.

In this study "CSMP classes" will refer to those classes which studied CSMP in grades K-3.

[1] See for example Evaluation Reports 3-B-1, 4-B-2, 6-B-1 and 7-B-2 for reports of testing done in grades 2-5, respectively.

The MANS Test and Previous Studies

The MANS Tests (Mathematics Applied to Novel Situations) are short test scales developed especially to assess what are thought to be some of the underlying thinking skills of CSMP.. MANS scales of various kinds have been used in the evaluation of CSMP in second through fifth grade.

The scales are administered by trained testers who follow a standardized script including sample problems for each scale. Then the students do the test items in that scale and the process is repeated for the next scale. The scales do not contain any of the special vocabulary or techniques of the CSMP program and most of them are built around mathematical situations that are unfamiliar to both CSMP and non-CSMP students.

In the spring of 1979, a set of 24 MANS scale was administered to about 50 fourth grade classes, located in 6 school districts using CSMP materials. About half the classes had studied CSMP through fourth grade; the other classes had no CSMP experience. The scales contained an average of $8\frac{1}{2}$ items and required an average of 5 minutes each, though the tests were essentially untimed except for those dealing with estimation. Three testing period of 50-60 minutes each were required. Included in these scales were the items from the Computation and Reading Comprehension tests of the Stanford Achievement Test.

The results of this 1979 comparative study are described extensively in Evaluation Report 6-B-1 of the CSMP Evaluation Report Series. The present study is similar to this previous 1979 study, differing only in the fact that the present fourth grade "CSMP" classes studied CSMP only through third grade. Comparison of the present results with those obtained previously will be presented in a later section.

Comparison of Class Means

The following procedure was used for each MANS test scale:

1. For each class, the roster of students was examined. Individual students in "CSMP classes" who had in fact no previous CSMP instruction (transfers) were eliminated from the study. Similarly, individuals in non-CSMP classes who had studied CSMP were also eliminated. This accounted for a total of 26 students in 14 classes.

2. Students who were absent during the testing session which contained the reading test were eliminated because of 3, below.

3. For each class, based on all students present for a particular MANS scale, a pair of mean scores was calculated: the mean score for the MANS test and mean score for the reading test.

4. These 14 pairs of class means formed the basic data for an Analysis of Covariance procedure, with reading score as covariate, with statistical significance determined by an F-test with 1 and 11 degress of freedom. The purpose of this procedure is to reduce the variability of mean scores by taking into account the ability level of the class, as measured by reading scores. It enables one to adjust these class mean scores according to differences in class ability levels.

Table 1 summarizes the results for all scales, with scales grouped together by categories according to the kind of problem contained in the scale. Two kinds of summary statistical data are given. First is given the adjusted mean scores across CSMP and across non-CSMP classes (adjusted for differences in reading ability). Second is given the p-value of the F-test on these differences, i.e. the probability of obtaining by chance a difference as large as the one observed had there been in fact no "true" differences between the two curriculum groups.

Table 1
Summary of Class Means

		Adjusted Means "CSMP"	Non-CSMP	Level of Significance
Computation:	C1 Stanford Achievement Computation Test	26.6	24.6	.21
	C2 Fractions	6.6	4.7	.01
	C3 Mental Arithmetic: Addition	3.4	3.1	.32
	C4 " " Subtraction	3.0	2.7	.39
	C5 " " Multiplication	4.6	4.6	.98
	C6 " " Division	4.6	3.5	.01
	Total	48.7	43.3	.07
Estimation:	E1 2, 5 or 10	8.7	7.6	.02
	E2 Estimating Intervals: Addition	6.1	5.9	.61
	E3 " " Multiplication	4.9	4.1	.01
	E4 " " Division	3.3	2.6	.02
	E5 Word Problem Approximations	3.0	2.5	.06
	Total	25.9	22.7	.02
Geometry:	G1 Geometric Congruencies	4.6	4.7	.77
Other Number Systems:	N1 Decimal Gas	2.7	2.0	.08
	N2 Negative Hits and Misses	3.3	2.4	.09
	N3 Measuring Fractional Inches	2.4	1.5	.01
	Total	8.4	5.9	.03
Number Relations:	R1 Solving Number Machines	5.7	5.4	.35
	R2 Using Number Machines	5.3	4.9	.47
	R3 Boses, Counting By	7.4	7.1	.19
	R4 Boxes, Multiplying by	6.8	4.0	.01
	R5 Labelling Number LInes	3.4	2.1	.01
	Total	28.6	23.6	.02
Place Value:	V1 Arrowed Number Lines	4.2	3.6	.13
	V2 Constructing Numbers	7.1	6.5	.04
	Total	11.2	10.1	.04
Word Problems	W1 Extraneous Data	5.2	4.5	.06
	W2 Two Stage Word Problems	4.1	3.6	.09
	Total	9.3	8.1	.08

CSMP classes did better on almost all of the scales and this advantage was significant, at the 5% level, on 9 of the 24 scales and nearly significant (5%-10% level) on 5 other scales.

On the following pages, this information is repeated on a scale-by-scale basis. For each scale an abstract of the scale and a sample item has been provided. The data has been placed in a box immediately above the corresponding data obtained in the previous 1979 study.
(Note that these are separate results so that factors used in adjusting scores may differ somewhat. However, the ability level of students in the two studies was comparable; the mean reading score across the present 14 classes was 20.3 and across the 51 classes in the previous study it was also 20.3.)
Because there were fewer classes involved, the difference in mean scores required to produce significance will be larger than in the previous study.

SCALE CATEGORY: COMPUTATION

	Adjusted Means[1] CSMP	Adjusted Means[1] Non-CSMP	Significance (p-value)
(C1) Stanford Achievement Test: Computation			
(Students took one of two 20-item forms)			
Abstract: 40 multiple choice questions of two different types: (a) standard computation, 22 items; (b) paired comparison of two computations, 18 items. With each type, items involved each of the four operations and at least 90% involved only whole numbers.	**26.6**	**24.6**	**.21**[1]
Sample: a) 522 × 32 f 16,924 g 2660 h 17,024 j 17,004 k NH b) 54 ÷ 9 ● 48 ÷ 6 > = <	23.3	25.3	.03
(C2) Fractions			
(Students took one of two 6 item forms.)			
Abstract: 12 items, with 6 of each type, identical to those in C1 except that 8 involved fractions and 4 involved large number multiplication and division.	**6.6**	**4.7**	**.01**
Sample: a) 6,000 ÷ 78 ● 6,000 ÷ 79 > = < b) $\frac{3}{5} - \frac{1}{5} =$ a $\frac{2}{5}$ b $\frac{4}{5}$ c $\frac{2}{10}$ d $\frac{2}{0}$ e NH	6.3	5.1	.01
(C3) Mental Arithmetic: Addition			
(Students took either C3 + C6 or C4 + C5)	**3.4**	**3.1**	**.32**
Abstract: An open number sentence involving addition must be completed without aid of pencil and paper, 5 items.	3.7	3.3	.01
Sample: 53 + 8 = ☐			
(C4) Mental Arithmeitc: Subtraction			
Abstract: Same as C3, but with subtraction, 5 items	**3.0**	**2.7**	**.39**
Sample: 72 − 4 = ☐	3.0	2.7	.03
(C5) Mental Arithmetic: Multiplication			
Abstract: Same as C3, but with multiplication, 8 items	**4.6**	**4.6**	**.98**
Sample: ☐ x 4 = 400	5.1	4.7	.07
(C6) Mental Arithmetic: Division			
Abstract: Same as C3, but with division, 8 items	**4.6**	**3.5**	**.01**
Sample: 150 DIVIDED BY 25 = ☐	5.0	4.1	.01
Total: Computation Scales	**48.7**	**43.3**	**.07**
	46.3	45.2	.38

[1] Boxed data = present study
Unboxed data = large 1979 study

14

SCALE CATEGORY: ESTIMATION

	Adjusted Means CSMP	Adjusted Means Non-CSMP	Significance (p-value)
(E1) 2, 5 or 10			
Abstract: Quickly estimate whether a given number is about 2 or 5 or 10 times as large as another given number, 13 items.	8.7	7.6	.02
	8.3	7.9	.02
Sample: 100 is about ____ times as large as 19			
(E2) Estimating Intervals: Addition			
Abstract: Quickly estimate which of 5 intervals contains the answer to a series of computation problems, 8 items.	6.1	5.9	.61
	6.1	5.8	.03
Sample: 475 + 86 0 10 90 100 900 1000			
(E3) Estimating Intervals: Multiplication			
Abstract: Same as E2, except multiplication, 8 items.	4.9	4.1	.01
	4.8	4.3	.01
Sample: 40 x 10 0 10 90 100 900 1000			
(E4) Estimating Intervals: Division			
Abstract: Same as E2, except division, and only 4 intervals, 8 items.	3.3	2.6	.02
	3.6	3.2	.01
Sample: 101 DIVIDED BY 9 0 1 10 20 100			
(E5) Word Problem Approximations			
Abstract: Quickly choose one of 4 round-number answers as closest to the exact answer to a word problem with relatively easy calculations, 6 items	3.0	2.5	.06
	2.8	2.6	.03
Sample: Susan has $131. Chairs cost $32. About how many chairs can Susan buy? 2 chairs 4 chairs 6 chairs 10 chairs			
Total: Estimation Scales	25.9	22.7	.02
	25.6	23.7	.01

SCALE CATEGORY: OTHER NUMBER SYSTEMS

	Adjusted Means CSMP	Adjusted Means Non-CSMP	Significance (p-value)
(N1) Decimal Gas	2.7	2.0	.08
	3.2	2.1	.01

Abstract: With word problems about gasoline, one step solutions are required in which the numbers involve decimals, 7 items.

Sample: Tom has 6.5 gallons.
He buys 3.5 more gallons.
How much gas will he have then? _____

(N2) Negative Hits and Misses	3.3	2.4	.09
	3.0	2.5	.01

Abstract: Given two rules [(a) each hit means a gain of 5 points (b) each miss means a loss of 1 point] and given a vertical number line running from 12 below zero to 15 above, players turns are described in part with the required task being to to complete the description, 6 items.

Sample:

Peter	Started with a score of	Number of Hits	Number of Misses	Ended with a score of
	10 below zero	1		12 below zero

(N3) Measuring Fractional Inches	2.4	1.5	.01
	2.3	2.0	.06

Abstract: Calculate the length of a given bar laid along a ruler marked in 1/2, 1/4 or 1/10 inches, 6 items.

Sample:

_____

Total: Other Number Systems Scales	8.4	5.9	.03
	8.5	6.6	.01

SCALE CATEGORY: NUMBER RELATIONS

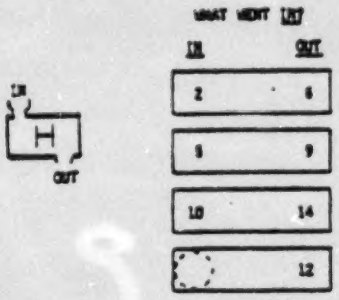
	Adjusted Means CSMP	Non-CSMP	Significance (p-value)

(R1) Solving Number Machines

Abstract: From 3 pairs of numbers, determine what the machine is doing to produce the second number from the first and use this knowledge to find the missing number from the 4th pair, 8 items.

	5.7	5.4	.35
	6.2	5.3	.01

Sample:



(R2) Using Number Machines (only done by students previously doing R1)

Abstract: Given a number of labelled machines in sequence, find the initial or the terminating number, given the other, 10 items.

	5.3	4.9	.47
	6.7	4.6	.01

Sample:

(R3) Boxes: Counting by

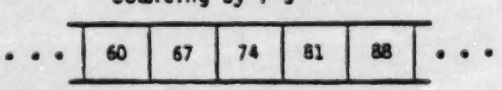
Abstract: Presented with an infinite series of boxes each of which contains a member of an additive series of numbers, questions are asked about the series' membership of other numbers, 4 different series, 12 questions (3 on each one series).

	7.4	7.1	.19
	7.6	7.2	.01

Sample:

Counting by 7's

Will 46 be in any of the boxes? _____

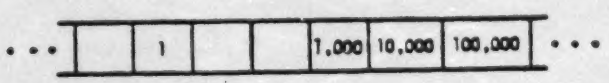


(R4) Boxes: Multiplying By

Abstract: Same idea and format as in R3 except that the series is multiplicative and specific empty boxes are to be filled in, 5 series, 13 items (empty boxes).

	6.8	4.0	.01
	7.9	4.1	.01

Sample:

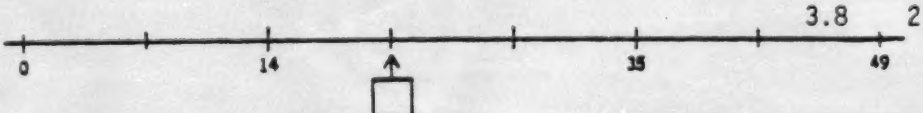


(R5) Labelling Number Lines

Abstract: Same basic idea as R4 only with an additive series in number line context, 6 number lines, 6 items.

	3.4	2.1	.01
	3.8	2.4	.01

Sample:



Total: Number Relations Scales	28.6	23.6	.02
	32.2	23.7	.01

SCALE CATEGORY: GEOMETRY

	Adjusted Means CSMP	Non-CSMP	Significance (p-value)
(G1) Geometric Congruencies	4.6	4.7	.77
	4.7	4.5	.13

Abstract: After examining 3 correct and 3 incorrect solutions to a sample problem, given a regular geometric shape and a number of parts, the shape must be divided into that many congruent parts, 8 items. The word "congruent" was not used.

Sample:

SCALE CATEGORY: PLACE VALUE

	4.2	3.6	.13
(V1) Arrowed Number Lines	4.2	4.2	.79

Abstract: Given a segment of a number line with four little arrows pointing to four different points, circle the arrow pointing closest to a given number, 12 items.

Sample:

	7.1	6.5	.04
(V2) Constructing Numbers	6.8	6.6	.38

Abstract: Given four different digits, and examples of legal and illegal 2, 3 and 4 digit numbers, construct a two, three or four digit number. The constructed number is either the largest, the smallest or the closest to a given number, 10 items.

Sample: Which three-digit number is closest to 600? ___

Total: Place Value Scales	11.2	10.1	.04
	10.9	10.9	.77

SCALE CATEGORY: WORD PROBLEMS (also see E5 and N1)

	Adjusted Means CSMP	Adjusted Means Non-CSMP	Significance (p-value)
(W1) Extraneous Data (Students took either W1 or W2)	5.2	4.5	.06
Abstract: Student must read a 4 or 5 sentence word problem, disregard one or two pieces of extraneous information and then complete the one step solution involving small whole numbers, 7 items.	5.3	4.9	.08

Sample:

Yesterday Ann bought 3 books.
Books cost 20¢ each.
Ann has 30¢ left.
She wants to buy a game that costs 45¢.
How much more money does she need to buy the game? _____

(W2) Two-Stage	4.1	3.6	.09
Abstract: Student must read a 2 to 4 sentence word problem and complete a solution involving two different operations, 7 items.	3.9	3.4	.01

Sample:

Pam gets 50¢ each week.
She always spends 30¢ and saves the rest.
How much will she save in 4 weeks? _____

Total: Word Problem Scales	9.3	8.1	.08
	9.2	8.4	.01

The similarity of results from the two studies is striking, whether one looks at means, differences in means, or p-values. There are some important differences, which will be described in the next section, but the data certainly support the hypothesis that students who studied CSMP in grades K-3 retain superiority over non-CSMP students in many areas after a year away from CSMP.

Figure 1, below, shows the graph of class means. For each class, the mean score on the total of all the MANS scores was plotted against the mean reading score. The common regression line for the two groups of classes is also shown.

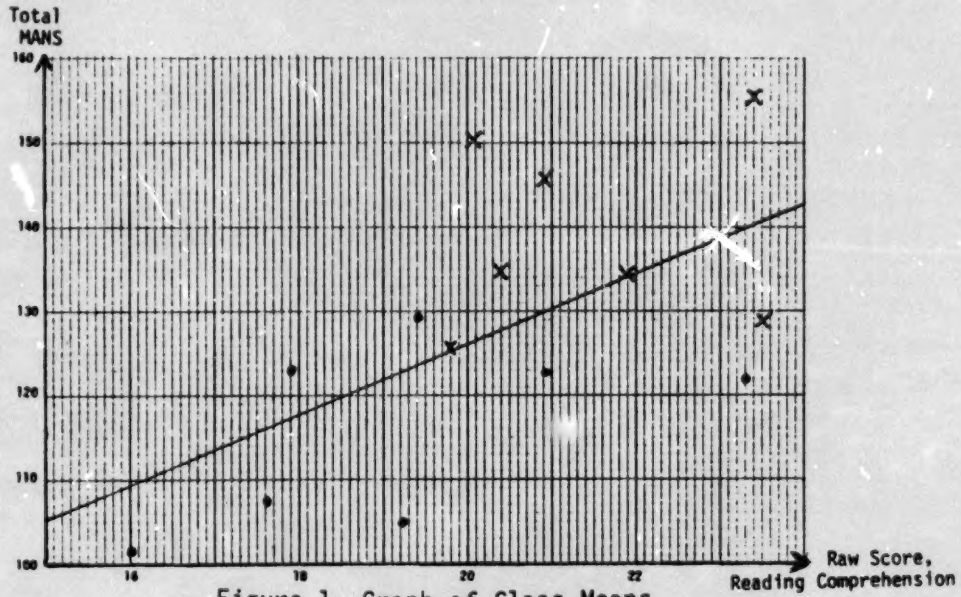


Figure 1, Graph of Class Means

X = CSMP class, • = non-CSMP class

Although the overall CSMP superiority is clear from the graph, one rather troubling feature is revealed. The CSMP classes are better in reading, and although scores have been adjusted to take into account for this difference, it is still true that at most only 4 of the 7 non-CSMP classes are in the same ability range as the CSMP classes (reading scores of, say 19 to 24). The graphs of district means, next section relieve this problem somewhat. It is also true that reading scores do not predict MANS scores particularly well and that higher reading scores do not necessarily result in higher MANS scores. There is probably a lot of variation in the way individual fourth grade teachers do or do not "follow-up" on their students' CSMP background.

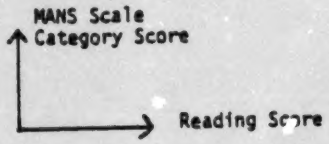
Comparisons with District Means from Previous Study

In the previous study, graphs were developed to show the mean scores for various participating school districts (6 in all). These graphs will be presented again here except that the present data has been superimposed.

Description of Graphs and Tables in Previous Study

For each scale category, (i.e. the total score from the scales within the category), a similar analysis of covariance procedure was used to compare school district means. At each district, the class mean scores were averaged separately across CSMP and non-CSMP classes.

The district means are plotted on the following pages as follows:

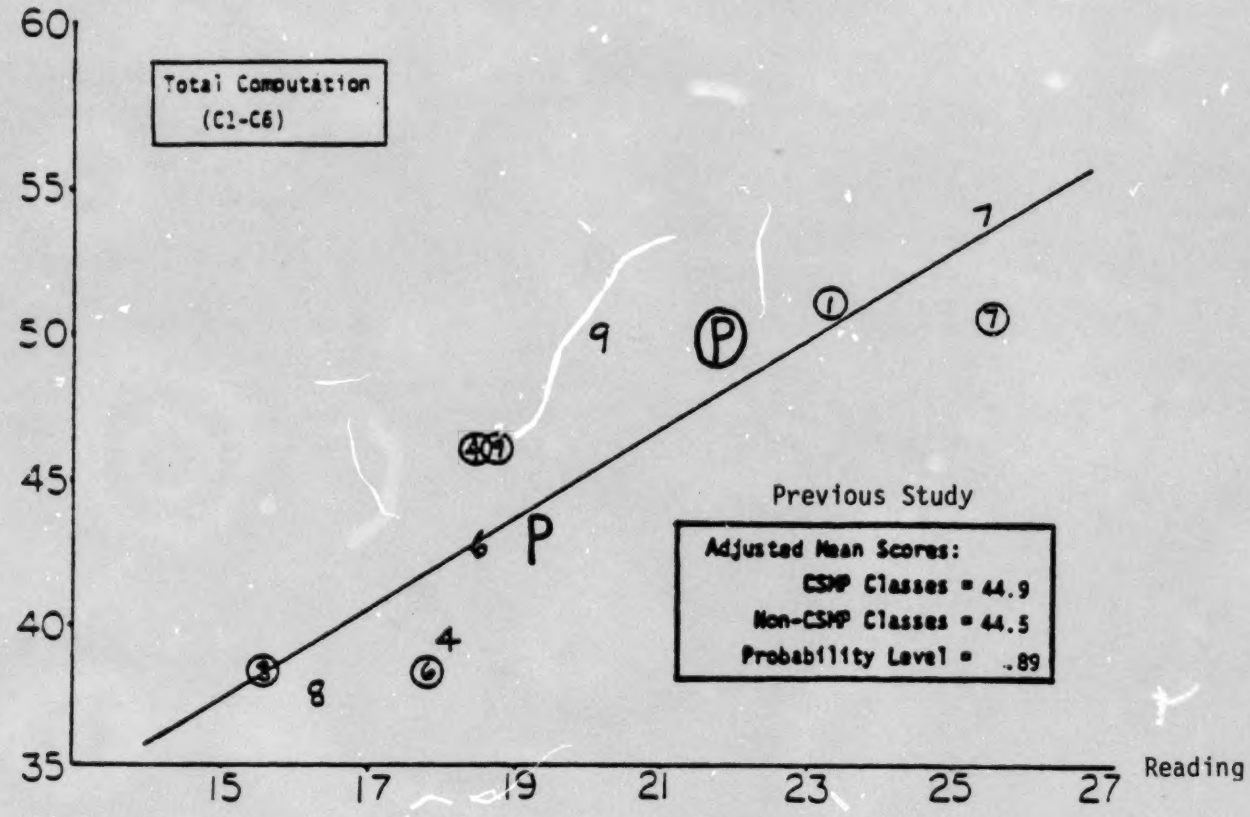


The entries on the graph are numerals corresponding to districts. A circled numeral is for the average of the CSMP class means in that district, a plain numeral is the best linear predictor of category score for a given reading score. Also given are the adjusted CSMP and non-CSMP means, and the level of significance, using the ANCOVA procedure (1 and 8 degrees of freedom). A total of 6 categories are graphed in this way.

Addition of Present Data to Graphs

For each graph the mean score across the 7 CSMP classes in the present study has been plotted and is indicated by a circled "P" (Ⓟ) and the mean score across the 7 non-CSMP classes is indicated by an uncircled "P" (P). Thus the reader can determine how well these two groups of classes did; not only according to what the regression line would have predicted based on their reading scores, but also whether their scores fit the respective patterns of CSMP and non-CSMP classes from districts involved in the previous study.

Total Computation

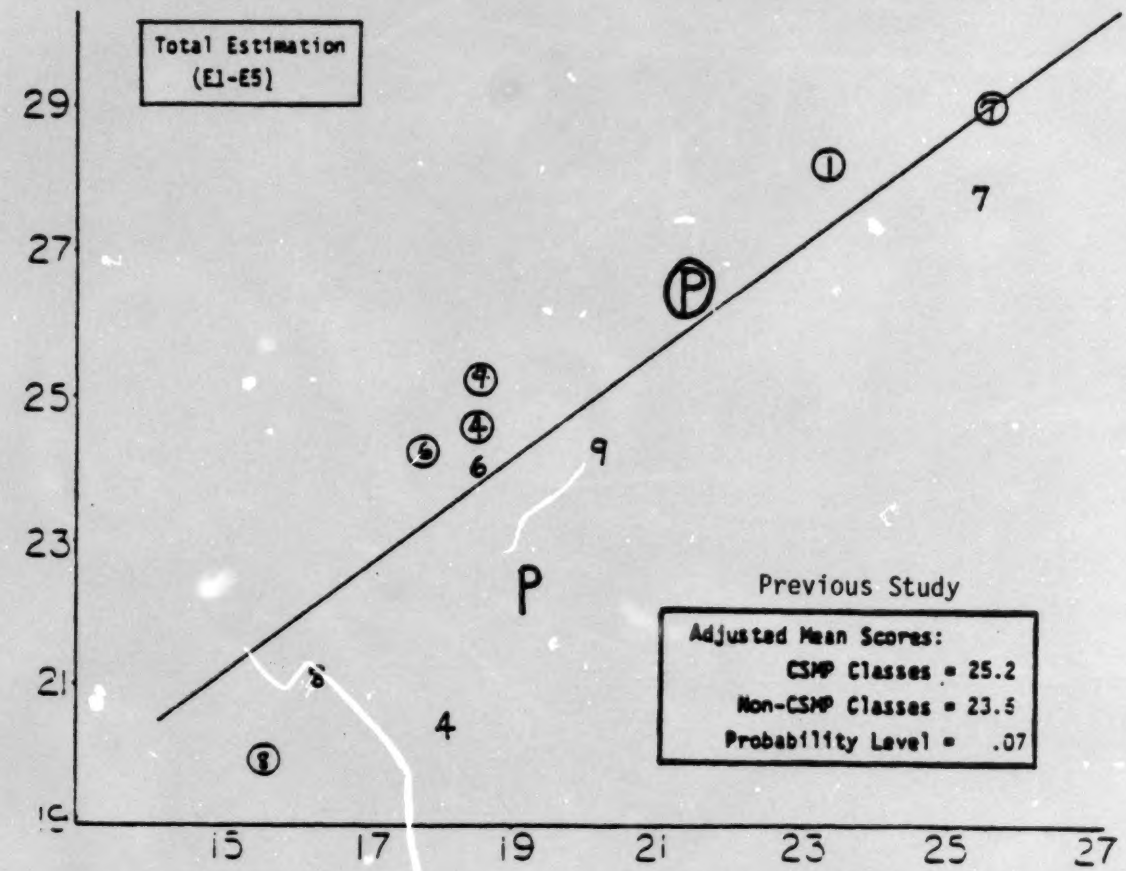


In neither the original study, nor the present study, was the difference between CSMP and non-CSMP classes significant. But this obscures an important result, which can be found on page 8. There were significant differences on some of the individual scales of the Computation category, but the scales where this occurred were different in the two studies.

In the original study, non-CSMP classes did better on the Stanford Achievement Test by about 2 points while in the present study CSMP classes did better by about 2 points.

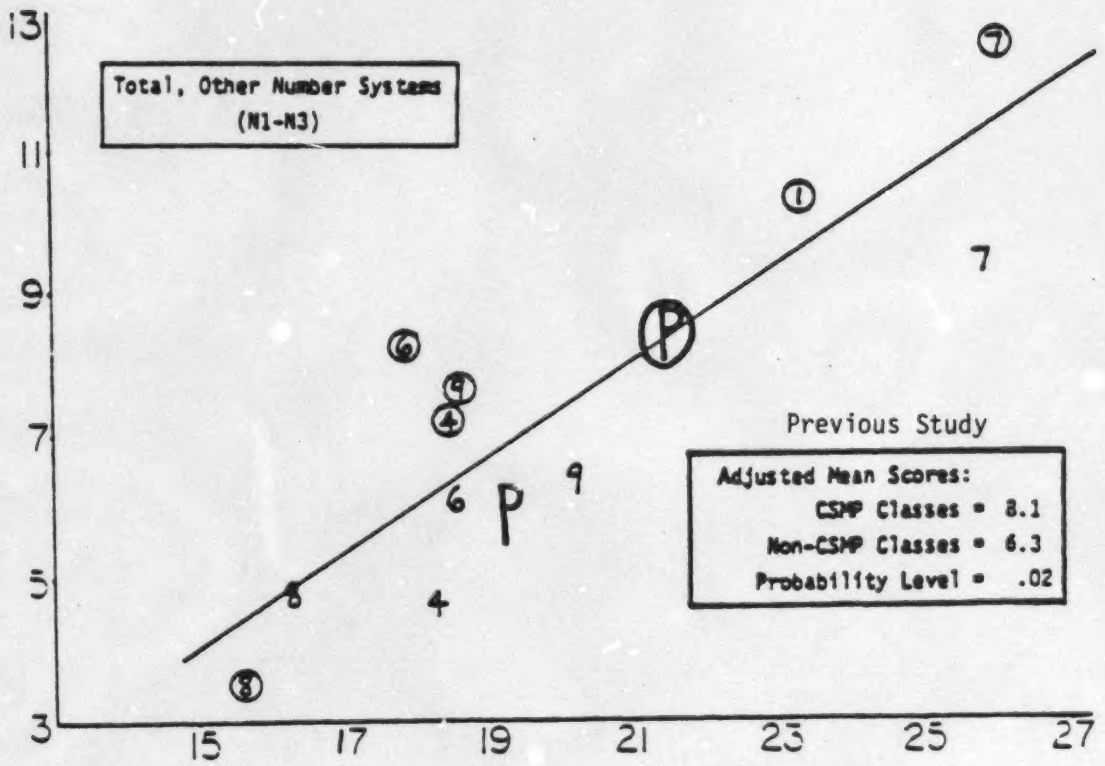
For the other scales in the Computation category, Fractions and the 4 Mental Arithmetic scales, CSMP classes did better by about the same amount in each study except Mental Arithmetic-Multiplication. For this scale there was no difference in the present study compared to an almost significant difference previously. This topic is given considerable attention in the CSMP fourth grade curriculum; thus the result is not surprising. On the other hand, the same is true of Mental Arithmetic-Division, on which there was a significant difference in both studies.

Estimation



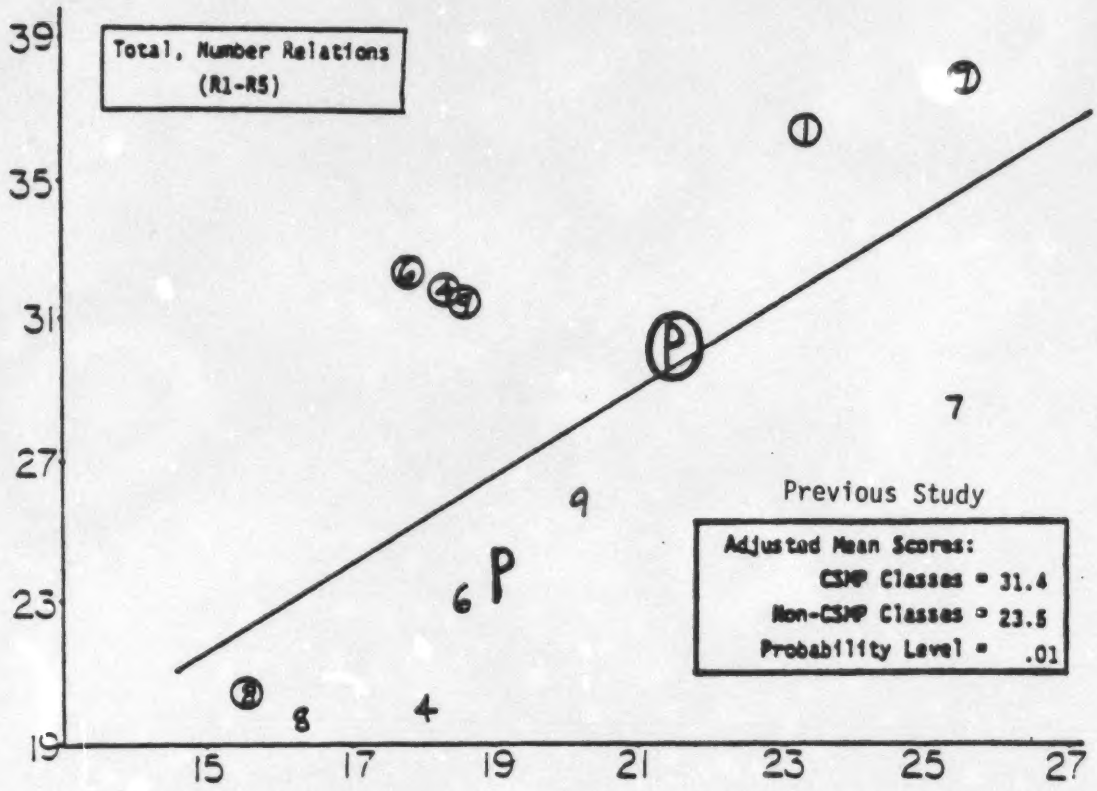
The present results are very similar to those obtained in the previous study. This is true whether one looks at the numerical data on page 9 or at the graph above, where the present CSMP classes appear to be in line with the previous CSMP classes, and similarly for non-CSMP classes.

Other Number Systems



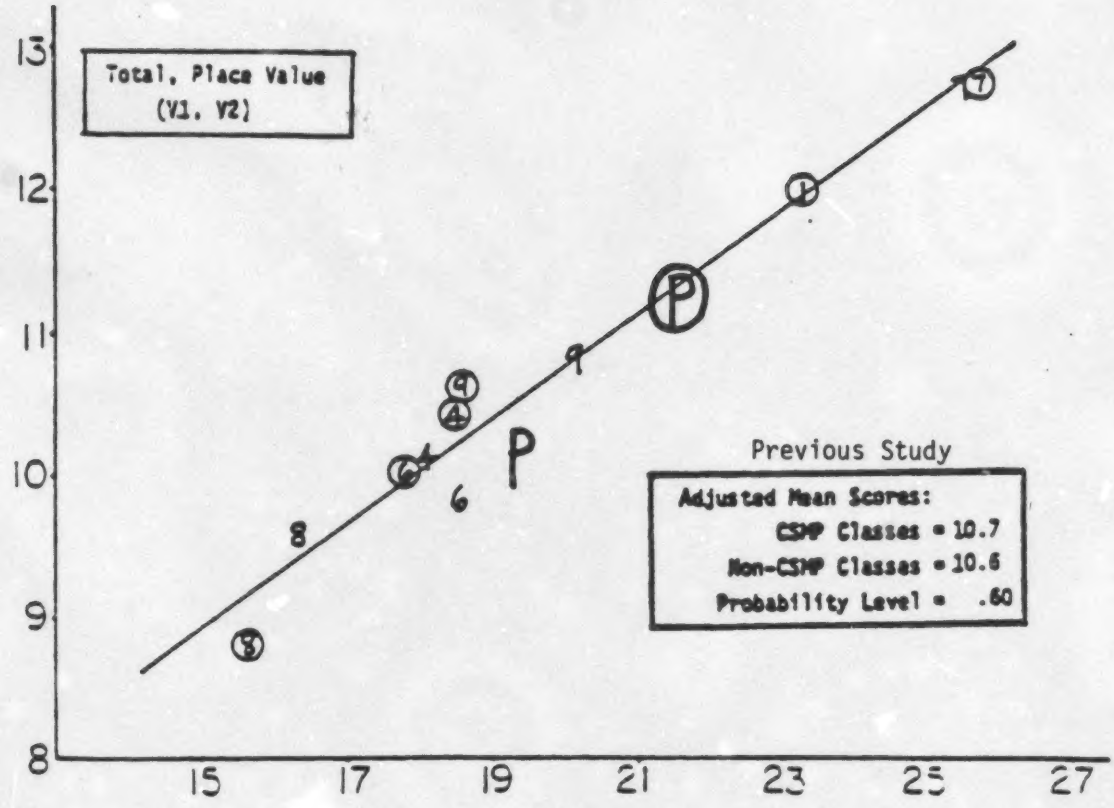
In the present study, the CSMP mean lies right on the regression line, i.e. better than the various non-CSMP scores but not as high as most other CSMP scores. The scale on which the present CSMP classes did relatively least well dealt with decimals, which receive very little emphasis before fourth grade in the CSMP curriculum.

Number Relations



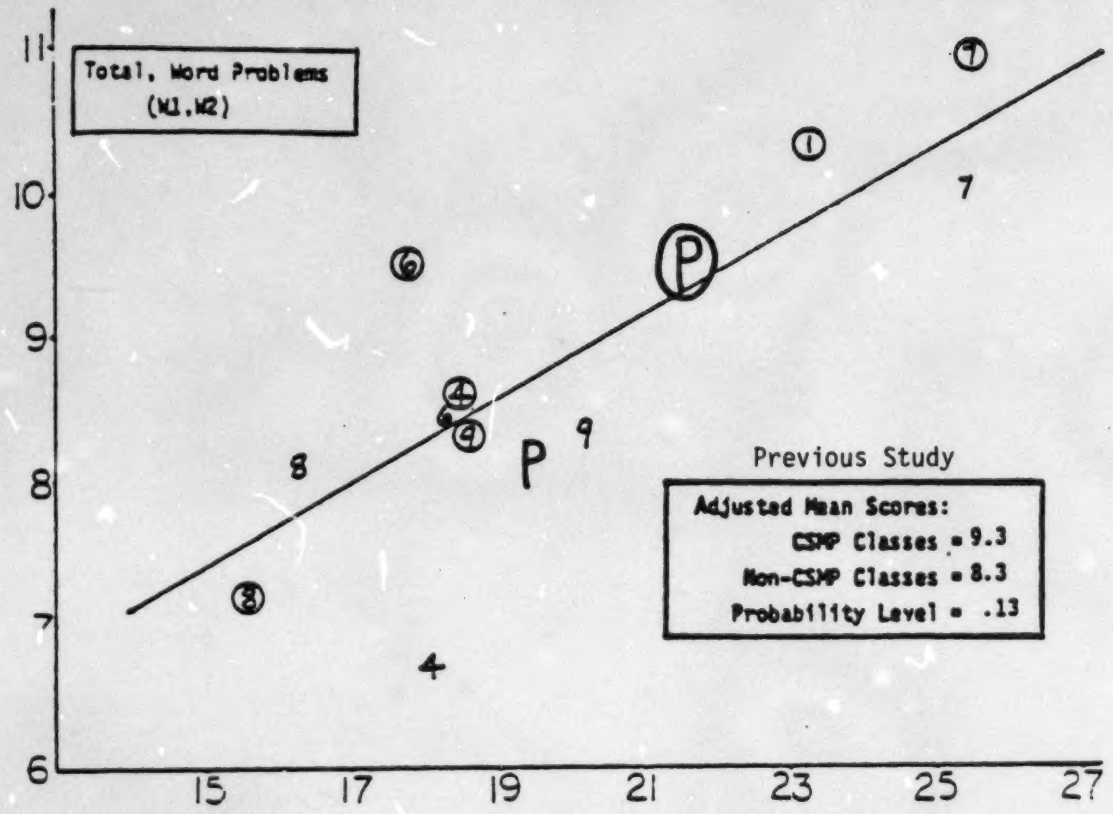
This graph shows the present CSMP classes scoring better, vis-a-vis the regression line, than non-CSMP classes in all districts, but not doing as well as most other CSMP classes. It can be seen on page 11 that for each of the 5 scales in this category, the present CSMP classes did better than their non-CSMP counterparts, but the difference was always smaller than that obtained in the original study. Thus, the year away from CSMP has reduced (by about half) their advantage in relational thinking.

Place Value



In the present study there was a significant difference in favor of CSMP classes on one of these scales and not in the other. In the previous study, there was virtually no difference on either. The graph shows that both groups fit the pattern from previous sites quite well. (Note also how well reading score predicts the score in this category; all entries on the graph lie close to the regression line.)

Word Problems



CSMP superiority of about half a point was recorded in both studies for each of the two scales in this category. The data from the present study is consistent with previous data, although the overall pattern is not as clear cut for this category as for others.

In summary, compared to the previous CSMP classes in other districts (who had studied CSMP through fourth grade), the present group of fourth grade "CSMP" classes:

- did better on: computation, especially the standarized portion
  place value, but only marginally
- did about the same on: estimation
  word problems
- did less well on: number relations
  other number systems, especially decimals
  (However, in both cases, they still do better than non-CSMP classes.)

Appendix

Class Means by MANS Category
Fourth Grade "CSMP" and non-CSMP Classes
(Raw Scores)

	Class ID	Reading Comprehension	Computation (C1-C6)	Estimation (E1-E5)	Number Relations (R1-R5)	Other Number Systems (N1-N3)	Word Problems (W1,W2)	Place Value (V1,V2)
CSMP Classes	1	20.2	51.8	27.2	33.6	11.2	9.7	12.2
	2	20.4	50.3	24.9	29.2	7.8	7.8	10.6
	3	23.5	48.5	24.9	25.5	6.0	8.8	10.4
	11	19.8	42.8	24.6	25.4	7.5	9.3	10.8
	12	21.9	47.3	25.4	27.9	8.5	9.2	11.2
	13	20.9	50.9	28.1	30.9	9.0	9.9	11.6
	14	23.4	55.4	29.2	31.9	9.0	11.8	13.1
non-CSMP Classes	51	17.9	48.0	22.5	24.1	6.3	7.8	10.3
	52	19.2	38.3	20.0	20.3	4.5	7.4	9.6
	53	23.3	43.0	23.1	25.7	5.7	8.4	10.8
	54	20.9	44.4	23.9	24.7	6.9	7.6	10.2
	61	19.4	48.1	24.0	25.4	7.9	8.9	10.1
	62	16.0	37.5	19.6	19.1	3.8	7.1	9.6
	63	17.6	37.0	22.7	21.5	6.0	8.5	9.1